ORIGINAL

BEFORE THE

Federal Communications Commission

In the Matter of AMENDMENT OF PARTS 2,22 & 25 OF THE COMMISSION'S RULES for an Allocation of Frequencies and Other Rules for a New Nationwide Hybrid Space/Ground Cellular Network for Personal/Mobile Communications Services	RM-7927

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Federal Communications Commission
Office of the Secretary

In the Matter of **CELSAT, INC** Request for a Pioneer's Preference Regarding Its Petition for Rulemaking to Allocate Spectrum and To Establish Rules and Policies for a New Hybrid Personal Communications Network Service	ET File No. PP - 28

CONSOLIDATED REPLY OF CELSAT, INC. TO COMMENTS AND OPPOSITIONS

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SUMMARY

CELSAT, Inc.'s Petition for Rulemaking and its Request for Pioneers Preference have, in effect, been brushed off and treated lightly by virtually all of the opponent applicants for the RDSS spectrum in the L/S-Bands. Rather than address the outstanding capabilities and attributes of CELSAT's comprehensive proposal for a space/ground *hybrid personal communications network (HPCN)* on either its technical merits or from the perspective of the public's welfare, the opponents have run for cover and ducked every opportunity to utilize constructively the process that the Commission has afforded them. Also, as an excuse for not addressing the tough but interesting issues which CELSAT's Petition raises, the opponents have rallied around the legal technicality of the RDSS "cut-off" rule, claiming that CELSAT can't possibly be considered as a viable contender for these bands because it missed the opportunity to file its application for use of these bands.

CELSAT not only shows them to be wrong in this respect (CELSAT can share, there need not be only one "cut-off" date for the RDSS band, and CELSAT will not be a "mutually exclusive" applicant), but it also responds fully to any and every possible question or criticism that any party raised or even suggested exists in their comments.

INTRODUCTION

CELSAT, Inc., Petitioner and applicant for a Pioneers Preference in the above captioned proceedings hereby respectfully files its consolidated reply to the various Comments, Opposition and Petitions to Deny or Dismiss filed on April 8, 1992. In support thereof, CELSAT states as follows:

I. CELSTAR® IS NOT INHERENTLY A "MONOPLY" SYSTEM

To divert attention from the superior qualities and enormous capacity of CELSAT's HPCN concept and proposed CELSTAR system, several parties attack it as an inherently monopolistic scheme, which clearly it is not. As shown and clarified below and at Sec. V.C., *infra*, these mischaracterizations can be dispelled immediately.

As they have chosen to do often in their filings, the opponents simply have either misread CELSAT's Petition and Request,[1] or simply failed to recognize HPCN's full potential. HPCN offers far more opportunity for competitive multiple entry at several levels than any wireless proposal currently before the Commission.

A. Opponents Have Misrepresented CELSTAR®'s Logical Configuration

At the outset it should be clarified that, yes, CELSAT has proposed that it be allocated either 32 MHz or 37 MHz to be used on an exclusive primary basis for its HPCN, but only because of its far superior ability to use this spectrum efficiently. CELSAT did not propose that it be the only, monopoly provider of HPCN services. In fact, it recommended that other HPCNs be accommodated in other bands. Petition, p. 33. Moreover, it expressly emphasized, in stark contrast to the misrepresentations of its request,[2] that its

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[1] See, CELSAT Petition for Rulemaking, filed February 6, 1992 (RM 7927) (sometimes "Petition" or "RM"; CELSAT Request for Pioneers Preference, filed February 10, 1992 (File No. PP-28), sometimes referred to as "Request" or "PP".

[2] Some of these mischaracterizations include:

"Celsat proposes that, if the Commission were to adopt its proposed rule changes, that it be awarded a monopoly license for use of the spectrum requested on "an exclusive, primary basis." This request is inconsistent with the Commission's rules governing award of a pioneer's preference and those governing provision of satellite communications services in the RDSS bands." LQSS Opposition, PP. p. 12.

"As a result of this lack of mutual exclusivity, grant of the VITA pioneer's preference did not raise the same Ashbacker issues that would be raised in this case." See Ashbacker Radio Corp. v. FCC, 326 U.S. 327 (1945). AMSC Opposition, PP p. 7, fn. 18.

"Celsat claims that there is some ability to share the band with existing users . . . ; however, it is apparent from the petition that only the exclusive use of the requested bands will enable Celsat to offer the system capacity it claims". AMSC RM p. 2.

"Celsat has not shown that its proposal is so novel or so different as to justify a rulemaking. In

system was uniquely capable of fulfilling the Commission's pro-competitive and multiple entry objectives in ways which will serve the Commission's objectives in several areas of public and personal wireless communications.. Petition, p. 38.

As one commenter thought to point out, CELSAT's purpose for requesting use of only one of possibly two HPCN band allocations on an "exclusive, primary basis" was for sound technical and public policy reasons only:

> "Fully functional, maximum capacity HPCNs must be constructed and operated as single, nationwide systems, each under the control of one licensee. . . . this is primarily for technical rather than purely economic reasons." Petition, p. 43, cited by LQSS Opposition, PP. p. 13, fn. 10.

Moreover, as explained at length (Petition, pp. 41-44), given the relative capacity advantages and superior spectral economies of the CELSAT proposal, requested use of only one of possibly two or more HPCN bands on such a basis appeared then, and still does appears to make good sense and good policy.[3] However, as discussed below, if the Commission is not so inclined to favor efficiency over multiple entry, then CELSAT's HPCN can and CELSAT will operate by sharing the spectrum with others. However, under this scenario CELSAT urges the Commission to consider adopting rules and refinements to its shared spectrum policy (such as proposed at Sec. I.C., *infra*) which facilitates sharing of RDSS bands only between and amoung the most spectrally efficient candidate systems. CELSAT's HPCN proposal clearly sets the standard against which eligibility should be judged.

> particular, it has not justified its proposal that the RDSS bands should be reserved for its HPCN system on an exclusive basis. " MSC, p. 3

[3] The Commission has indicated that it would consider granting exclusive use of satellite spectrum if the system design was so "unquestionably superior [as] to justify a departure from [its multiple entry] policy." RDSS Licensing Order, 104 F.C.C 2d, at 653-54 and n. 14.

B. CELSTAR® Is Amazingly Flexibility, Both In Space and On the Ground, And Offers The Most Options For Achieving Spectrum Optimization, Including Sharing In Several Forms

Dire predictions of the total demise of all the effort expended to date by the other applicants in pursuit of the RDSS L/S-Band are simply misplaced. Assumptions like the following are incorrect:

> "A grant to CELSAT for its sole provider system would effectively deny the applications of TRW and all the other RDSS-band applicants, several of which can co-exist in a shared-spectrum environment. " TRW Petition to Dismiss or Deny p. 17.

No such result needs to follow if the Commission , after full consideration of the HPCN's benefits and advantages, still favors a conventional multiple entry competitive environment. CELSAT has shown how its HPCN concept will introduce multiple levels of competition into the wireless marketplace even if it were to be the exclusive user of one of its proposed bands. HPCN promises new MSS competition in space, a third ground-cellular competitor, and competition at the microcell level. Petition, pp. 19-24; 39-41.

But CELSAT's HPCN offers still further possibilities for competitive entry at all three levels -- in space, among the ground cell regions, and again at the microcell level.[4] Moreover, should it be authorized to operate in the RDSS L/S-Band, there is reason to believe that CELSAT's domestic system would offer a high degree of compatibility with other CDMA users of this spectrum -- worldwide. As will become

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[4] CELSAT's clarification of its sharing capabilities is shown here and at Sec. V.C., *infra*, to be consistent with apparent improvements in the concept apparently supported by GTE:

> "However, to the extent spectrum is allocated for one service, it could foreclose its availability for another service. It is worth noting that CELSAT's proposal for spectrum for a satellite service - which GTE agrees is an inherently national license - is leveraged to request the FCC for a national license for PCS on the terrestrial portion of CELSAT's network scope of geographic license coverage of PCS is one of the issues in GEN Docket No. 90-314." GTE, RM, p. 3.

(CELSAT's proposal will not "foreclose" the availability of other services; it will stimulate and provide for them.) Also,

> "Should the FCC explore CELSAT's proposed system in a Rulemaking, the Commission may wish to critically evaluate whether the terrestrial portion of the system could only be implemented on a national licensing basis. Alternatively, the FCC could require Common Air Interface (CAI) specifications that would allow handsets to be used on multiple PCS vendors' systems, whether they are terrestrial or space-based. . . . " GTE Comments, RM p. 3

apparent, CELSAT will foster the Commission's pro-competitive policies more so than any other option before it.[5]

1. CELSTAR® Offers the Most Spectrally Efficient System, By Far, And Logically Should Be Assigned Spectrum In The Manner Initially Proposed

TABLE I: CELSAT COMPARISON

	COST/ VG CKT/ YEAR	EQUIVALENT VOICE CIRCUITS,	FREQUENCY EFFICIENCY (EQUIVALENT VG CKTS/ MHz)	SUBSCRIBER UNIT AVERAGE POWER
CELSTAR	$640	60,905	1903	0.1 WATT
LQSS	$8000	6,500	197	0.5 WATT
IRIDIUM	$12000	4,400	419	0.5 WATT
TRW	$5000	4,600	139	0.5 WATT

Celsat, in its initially proposed configuration, is the most frequency efficient system by an order of magnitude (see TABLE I).[6] Celsat will also offer the American people the lowest possible price (less than 25 cents per minute for a voice circuit) because it has the lowest annual cost for its satellite circuits. This high quality, ubiquitous service will make telephony and other services available everywhere in the United States at prices lower than cellular. This, is innovation of a high order promising provide major benefits to the public. In addition, Celsat users will be able to operate at one fifth the average power of the

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[5] CELSAT supports the Commission's long adherence to a policy of open entry in the satellite communications services:

> "Our experience with introducing competition into a variety of different communications services over the last several decades has been that the public benefits associated with competition, such as increased choices and lower prices for consumers, are more likely to be realized where there is competition among providers. Radio determination Satellite Service, 60 RR 2d 298, 305-06 (1986). LQSS Opposition, PP. p. 13.

[6] CELSAT's superiority is, of course, retained relative to the other proposed systems in any configuration, even in a shared spectrum environment. See, I.C., *infra*.

competing systems (0.1 watt versus 0.5 watt) and one-sixth the power of current portable cellular systems. These benefits appear to be so significant as to warrant the strong consideration, at least as among the existing candidates, for exclusive use of the one or other of the requested bands.[7]

a. "Pseudo Sharing" On An IRU Basis Makes Sound Sense

At least two opponents incorrectly criticize Celsat's proposal for a system of pseudo spectrum IRU sharing of satellite capacity with other service providers as one which the Commission has previously rejected in favor of licensing multiple service providers (Petition, at 46-49):[8]

> "In a prior RDSS licensing proceeding, Omninet Corporation similarly proposed a system which was technically incompatible with other applicants, so that granting its application would have given Omninet a monopoly. Radiodetermination Satellite Service, 60 RR 2d at 303. Like Celsat, Omninet suggested that multiple entry may be achieved by authorizing one coordinated satellite system to be shared by multiple providers with separate ground segments and marketing mechanisms.l Id. (footnote omitted). The Commission flatly rejected this proposal, pointing out that the public benefits associated with competition arise only when there are "independently operating systems. Id. at 303-04." LQSS RM p. 14.

The scheme rejected in that order was not like the true IRU proposal made by CELSAT. It is CELSAT's understanding that Omninet had proposed merely to extend capacity to other carrier/providers on a contract basis, as mere long term bulk users of the satellite. In contrast, CELSAT is proposing to offer an Indefeasible Right of Use, i.e., effectively an independent ownership interest (i.e., not a consortium) in the power and/or system capacity of the two CELSAT satellites. With these IRU's the purchasers would

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[7] By this CELSAT is suggesting that CELSAT's spectral efficiency and utilization is so supperior to the other proposals that it would be justifiable for the Commission to grant a license only to CELSAT at this time, and entertain other applicants in the future on a shared basis as new proposals emerged having compable capabilities. In others, keep the "sharing" window open.

[8] See, also, TRW:

> "The monopoly, voluntary, "pseudo sharing" approach advanced by CELSAT is directly contrary to the Commission 's RDSS rules, and squarely conflicts with the varying, but compatible approaches advanced by TRW, Constellation, Ellipsat and LQSS. " TRW Petition to Dismiss or Deny p. 11, fn. 8.

be free to offer which ever services the Commission authorizes, to which ever markets they choose -- nationwide and at very low cost relative to constructing their own satellite system.

CELSAT still believes that its IRU proposal has considerable merit, and irrespective of what the other parties think of this offer, CELSAT still requests that the Commission reflect such an opportunity in its rules.[9]

b. CELSTAR®'s Ground System Offers Enormous Potential Opportunities For Competitive Entry, Both At The Level Of Conventional Ground Cells and Microcell Systems

As discussed here and elsewhere (Sec. V.C, *infra*), CELSAT's HPCN is two system capabilities -- space and ground -- operated under one network controller. The controller allocates transceiver connections to space or ground cells based on either signal strength and availability or other predetermined criteria. (Petition at pp. 12 - 15.)

While CELSAT elected not to propose all possibilities initially, the combinations and permutations possible under HPCN, including in space and on the ground, are conspicuously apparent.[10] CELSAT explained at length, however, why it is technically necessary to maintain the network controller under the jurisdiction of one, primary spectrum licensee, regardless of the level of sharied use. Petition, pp.43-45 .

CELSAT's rationale behind its initial urging that there be only one licensee over <u>all</u> the potential ground cell operations was premised on the statutory requirements of the Communications Act which, historically,

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[9] CELSAT's interest in the IRU concept exists notwithstanding its spectrum sharing proposals discussed, *infra*.

[10] While GTE acknowledged CELSAT's potential, the other poonent/applicant have an obvious self-interest in not highlighting the opportunities presented by HPCN.

have been interpreted to require that the licensee of the spectrum must also be the true "owner, operator and party in control" of the licensed system. 47 U.S.C. §§ 307 - 309.

To the extent that there might be precedents emerging that will permit different, more liberal application of these statutory provisions to permit less than full ownership or control in the system by the spectrum licensee, then the following modification of CELSAT's HPCN proposal for the ground system becomes both legally feasible and very attractive, both from a public policy perspective and from CELSAT's business perspective.[11] Briefly, this would permit the opening of from 10 to 14 very large separate regional ground cellular markets to compete directly with the established wireline and nonwireline cellular licensees, as well as with each other.

Accordingly, CELSAT is proposing at Section VI, *infra,* that the Commission amend Part 22 of its rules to permit the ownership, control and operation of HPCN terrestrial systems operating on designated subbands to be allocated for HPCN use by secondary licensees. Such secondary licensees would, however, be bound by the operating parameters and other obligations to the principal satellite spectrum licensee.

2. CELSTAR® Can Share the RDSS Band With Motorola's IRIDIUM

CELSAT is well aware of the difficult problem that is confronting the Commission concerning the demands on it to reconcile use of the RDSS L/S-Bands among potentially competing applicants. CELSAT does not wish to and, in fact, will not "exacerbate" this problem; instead it will solve it.

All parties appear to agree that the Commission's current RDSS rule (47 C.F.R. § 141(f)) requires that the L/S-Band be shared among multiple entrants. Motorola, however, as one applicant for a license in this

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[11] Relevant precedents have emerged, for example, in the area of license transfers to creditors in the context of recent bankruptcies or foreclosures in the broadcast industry.

band, insists that its proposal to use only 10.5 MHz in the L-Band and leave the remaining 22 MHz (5.5 in the L- and 16.5 in the S-Band) to be shared by others is consistent with the rule's sharing requirement.

CELSAT agrees that Motorola has a point, and should the Commission accept Motorola's interpretation then CELSAT wishes to be considered as a "shared user" of the RDSS spectrum with Motorola for of the S-Band link only (2483.5-2500 MHz), as the downlink (space-to-earth) for its HPCN system. CELSAT then requests that the Commission pair this S-Band spectrum with 16-20 MHz in any one of the other bands identified in Section VI below to complete an HPCN functional pair.

No other party has expressed either an interest in such a combination, or an ability to operate in such an alternatively derived spectrum pair. CELSAT can operate an HPCN on such a basis, however, and still retain all the advantages of capacity and spectral efficiency set out in its Petition. Moreover, the public would benefit tremendously from the fact that the U.S. would be able to introduce simultaneously both a worldwide LEO system as well as a world class HPCN system.

3. CELSTAR® Can Also Share Spectrum With The "Gang of Four" and Others

Virtually every opponent has accused CELSAT of being unable to operate in the RDSS L/S-Band spectrum with others, and falsely accused it of requiring a "monopoly" over those bands.[12] Neither is true. It is most peculiar that none of the "experts" before the Commission made a point of the fact that CELSAT

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[12] See, e.g.:
"However, it is apparent from the petition that only the exclusive use of the requested bands will enable Celsat to offer the system capacity it claims." AMSC Opposition, PP p. 2, fn. 2-3.

"The grant of an exclusive licensee of the a request would make Celsat the exclusive licensee of the HPCN system." AMSC Opposition, PP p. 2

is also proposing a spread spectrum system, and as such would appear to be technically capable of sharing the RDSS bands with others on a spread spectrum basis.

Indeed it is, and if the Commission should decide to stay with this requirement under the existing RDSS rules, then CELSAT is prepared and willing to share on a spread spectrum basis with the "Gang of Four" and any qualified others that now or in the future become eligible in these bands. CELSAT can not over emphasize, however, that there is no legal time limit under the RDSS rules within which sharing of the band must be brought to a close for the L/S-Band. While technical or practical reasons might exist for eventually limiting the number of shared users, that point has not yet been reached, even if CELSAT's application is included. (See Sec. I.C, *infra.*)

Here again, CELSAT would submit that such sharing will sacrifice some spectral efficiency in favor of potentially more entrants. However, even so, CELSAT will be predominant among them.

To facilitate sharing in the most efficient manner possible, CELSAT is proposing by rule in Sec. I.C. a method and a rule provision by which it should be accomplished. CELSAT believes that its contribution in this respect is substantial, and itself is deserving of an award of a Pioneers Preference.

C. CELSAT Proposes A Means And Rule Change By Which True Sharing Of The RDSS Band By Spread Spectrum Users Can Be Attained

The Commission should adopt flux density allocation rules and procedures to encourage the most efficient use of shared bands. But insofar as CELSAT is aware, neither the Commission nor any other party has given adequate consideration as to how this might be accomplished. In the interest of facilitating this potentially necessary feat, CELSAT has expended considerable effort in studying how flux sharing might be done.

The recent round of comments and replies have emphasized the difficulties that can arise in allocation and administering bands such as the RDSS marked for spectrum-sharing by band spreading waveforms. The Commissions rules at 25.141 (f) recognize coordinated power flux density limits as an essential part of making this work. The rules further suggest that licensees should coordinate with one another to establish such limits.

The comments and replies, however, suggest deep inherent difficulties in carrying out this process as the rules envision.[13] Several of the current round contenders, and CELSAT have recognized that flux density is a significant determinative of circuit capacity and economic viability. Accordingly they, and CELSAT, have requested significant waivers or extensions of existing flux density limits. Cross comments have further emphasized the disagreements that have arisen between contenders in what might constitute reasonable limits and how they are to be calculated, particularly in the case of time-division systems.

The Commission's interest should be to insure that this complex process is administered in such a way as to maximize the public benefit by encouraging the most efficient use of bandwidth *and* flux density. CELSAT suggests that this will require a somewhat more active role of the Commission in the specific allocation of flux density limits to control the relative shares in such shared bands. The underlying

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[13] In this connection, AMSC's rather dismal assessment of the practicality and feasibility of band sharing by spread spectrum applicants is clearly wrong and disputed by CELSAT's analysis:

> "In the RDSS downlink band, the power flux density to be generated by the proposed non-geostationary systems would require the applicants to coordinate their systems' operation with fixed systems and other services the success of which would be doubtful, given the severe interference these systems would cause. To make matters even worse, Inmarsat has submitted to the International Frequency Registration Board a proposal to operate its own non-geostationary and geostationary MSS systems in the RDSS bands. AMSC demonstrated that, to avoid causing harmful interference to other users of the RDSS bands, the proponents of these systems typically would have to reduce the systems' capacities to less than ten channels, a reduction so drastic as to make the cost of the systems' construction and operation clearly uneconomical." AMSC Comments, RM p. 5.

theoretical framework for such policy and several policy options are set forth in SUPPLEMENTAL APPENDIX E to this Reply.

However, in order to provide the regulatory basis for such flux density administration there appears a need for a general enabling rule. For this purpose CELSAT offers the following specific proposed amendment to Part 25:

> *Amendment of rule 25.141 (Licensing provisions for the Radiodetermination Service)*
>
> > *25.141 (h) Licenses granted under the total band-sharing policies defined in Sections (e) and (f) above shall be subject to specific flux density limit definitions and allocations administered in such a manner as to (i) encourage the most efficient use of bandwidth and power flux density among multiple spread spectrum sharers; and (ii) allocate the available power flux density so as to favor the most spectrally efficient sharers.*

CELSAT further submits that the Commission ought to direct the candidate licensees for the RDSS L/S-Band to convene among themselves, perhaps under the aegis of the negotiated rulemaking process, and agree on methods and means by which such spectrum sharing and efficiency objectives might be carried out. And for this purpose, CELSAT suggests that its SUPPLEMENTAL APPENDIX E offers an appropriate place from which to start.

II. CELSAT IS NOT FORECLOSED FROM ACCESS TO THE RDSS BAND

The opponent/RDSS applicants are uniform in their assessment of CELSAT's chances and entitlement to consideration under the RDSS L/S-Bands:

> "Moreover, assuming that a Celsat-type system could meet the technical constraints imposed on MSS systems operating in the RDSS band - which Celsat has clearly not demonstrated - the fact is that Celsat's system application, if and when it is filed, cannot be considered with the RDSS applications that are in the current processing group. The cut-off date for filing an application to be considered with this group of applications was June 3, 1991." MSC RM p. 6; see, also, LQSS RM p. 8;

As pointed out above, the Commission need not be concerned that a guarantee of a license to CELSAT would necessarily foreclose all six of the other current petitioners from offering their proposed RDSS and/or MSS services in the RDSS bands. TRW Petition to Dismiss or Deny p. 11.

On the other hand, the opponents are quick to assert that CELSAT is precluded from consideration in the RDSS bands because of the June 3, 1991 cut-off date and the fact that CELSAT did not file an application by that time. CELSAT submits that these opponents are blind to the literal and intended purpose and effect of the RDSS Rule, Section 25.141 (47 C.F.R. §141 (f) (new).)

A. CELSAT Is Not A "Mutually Exclusive" Candidate

The opponents are mistaken in their representation that CELSTAR presents a "mutually exclusive" potential new applicant and, thus, the cases they cite in support of the proposition that CELSAT is precluded under the cut-off rules are inapposite:

> "As the Supreme Court's decision in Ashbacker makes clear, the Commission may not lawfully exclude particular mutually exclusive applicants from full comparative consideration. The Communications Act requires that all such bona fide applicants be considered on an equal footing once accepted for filing. The post-filing imposition of "innovativeness" as a "threshold" eligibility criterion operates to deprive any non-preferenced" applicants of their Ashbacker rights." TRW Petition to Dimiss or Deny p. 16; also, LQSS Opposition, PP. p. 13, fn. 11.

Also,

> "The Commission has thus made clear that a mutually exclusive application filed after the cut-off period will be dismissed, and will not be considered in conjunction with original application(s) placed on public notice or those timely filed in response thereto." TRW RM p. 7; also, AMSC Opposition, PP p. 7.

Again, as CELSAT has pointed out above it is capable of sharing the RDSS L/S-Band with either Motorola, the Gang of Four (TRW, LQSS, Constellation and Elipsat), or any combination of them. Therefore, the prospect of considering its application for spectrum in this band on a shared basis does not present a situation of another "mutually exclusive applicant", and the arguments which historically have applied in such cases do not apply here.

B. Whether Re-opened Or Started Anew, The "Cut-Off" Is No Barrier To CELSTAR®'s Co-Use Of The RDSS Spectrum

On April 1, 1991, as numerous parties have pointed out, the Commission released a Public Notice accepting for filing applications which requested the use of the 1610-1626.5 MHz and 2483.5-2500 MHz bands - frequencies allocated domestically to the radiodetermination satellite service ("RDSS") - for proposed

satellite systems. Public Notice, 6 FCC Rcd 2083 (1991). That Notice, issued pursuant to what is now Section 25.141(b) of the Commission's Rules, established a 60-day cut-off period, ending June 3, 1991, during which interested parties could file competing applications proposing satellite systems which would make use of the same RDSS frequencies. With this, CELSAT does not disagree.[14]

Further, to some the Public Notice made clear that a mutually exclusive application filed after the cut-off period would be dismissed as unacceptable for filing, and would not be considered in conjunction with the original application(s) placed on Public Notice or the applications timely filed in response thereto. TRW Petition to Dismiss or Deny PP p. 5-6; also, AMSC Opposition, PP p. 2, fn. 2.

What each party fails to note, however, and what they would have the Commission disregard is the fact that the express sharing provision of the RDSS rule is not constrained by only one window or a permanent "cut-off". (47 C.F.R. §141(f).) There is nothing on the face of the rule or in the Commission's past interpretation of its RDSS policies that state that there shall be only one cut-off date for sharing applicants in the RDSS bands, after which no further potential "sharers" can be considered, or after which the existing licensees would no longer have to share with others. Therefore, to merely establish one "cut-off" does not preclude the Commission from establishing another with respect to the same band so long as additional beneficial sharing can reasonably still be accommodated technically in the band. In Section I.C. above, CELSAT has shown at Sec. I.C. and SUPPLEMENTAL APPENDIX E that this is technically possible.

Thus, if the Commission believes that it cannot make an exception to its past general practice and re-open the cut-off window for a CELSAT application, then immediately after CELSAT's application is filed the

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[14] It should be kept in mind that the term "competing" in the context of the RDSS rule relates to the potential for "mutual exclusivity" between and among the applicants, and not the capacity of the applicants to vie among each other for customers once licensed.

Commission could -- and is hereby requested -- to establish a second cut-off, receive CELSAT's application and simply consolidate it with the others for processing. Moreover, including CELSAT in the original group rather than in a second, yet to be established group, would be far more productive, since it would permit CELSAT (as a potential Pioneers Preference grantee and new entrant, even if down the road) an opportunity to participate early in the important spectrum coordination process with the others.

Inclusion or Other Consideration of CELSAT In The RDSS Band Will Not Delay Service To The Public

Finally with respect to the cut-off issue and irrespective of how it is resolved, a grant of a Pioneers Preference to CELSAT for use of the space segment on a shared basis with others should not delay the start of service or the resolution of the other pending applications.[15] Delay can be avoided if the Commission simply issues a notice of tentative Pioneers Preference grant to CELSAT while continuing to process the existing applications. This will serve notice on the sharing candidate(s) that they (or "it" in the case of IRIDIUM) should anticipate "company" in the bands, and plan accordingly. Most importantly, however, if the Commission's choice involves the "Gang of Four" approach to spread spectrum sharing, they must be advised and required to include CELSAT, as a tentative preference grantee, in the pre- or post decision negotiations leading to any resolution and adoption of the sharing scheme to be deployed.

C. CELSAT Had Good Cause For Not Making The Original Cut-Off

CELSAT had good cause for not filing an application before the first cut-off date. First, it was still only avery new company, not yet incorporated for even one year prior to the date of the Notice. (CELSAT was incorporated on May 14, 1990.) Second, and also impotant, CELSAT's patent application was still pending and CELSAT had to be extremely cautious about making any premature disclosures. And third, CELSAT was actually inspired by the Pioneers Preference order last March to first begin thinking that maybe it had a chance to pursue a HPCN license under the Commission's bold new scheme.

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[15] See, e.g., the allegations of TRW, RM, p. 9 and 16.

III. CELSTAR®'s TECHNICAL FEASIBILITY HAS NOT BEEN CREDIBLY CHALLENGED

The failure of GTE, Motorola, TRW, and LQSS to make a single technical comment is most unusual. CELSAT is greatly perplexed by such a response and one can only conclude that either they recognize the validity of our approach, or that they did not take the time to properly review it. In this case, their remarkable silence can not be excused by simply stating that insufficient material was presented. This is a preposterous technical position, and an abuse of the Commission's process and the opportunity which it afforded these parties to speak out against CELSAT on the merits.

Several opponents argue that "CELSAT has not demonstrated that its CELSTAR proposal possesses the characteristics required for a preference; that its efforts were significant in developing the technology utilized; or even that all of the elements incorporated in its application are technologically feasible." TRW Petition to Dismiss or Deny p. 13. As CELSAT demonstrates below, such broad, non-specific contentions are merely a cover for the fact that these otherwise highly qualified critics could not find any serious technical flaws or omissions to really take issue with.

Also, on the issue of technical feasibility, the parties found themselves taking conflicting positions. On the one hand, they would have the Commission believe that CELSAT's rule making proposal should be dismissed because its HPCN concept has not been shown to be technically feasible. On the other hand, they are just as quick to assert that CELSAT does not deserve a pioneers preference because its proposed technology is well known. Clearly the technology would not be both well known and technically infeasible.

Specifically, LQSS for example, agrees that:

> "because CELSAT has made no attempt to claim responsibility for any of the following key elements, it must be assumed that they are well within the state-of-the-art and therefore pose neither exceptional technical risk nor doubt as to their performance:
>
> 1. a large, unfurlable high gain antenna with over 100 image feeds;
> 2. use of geostationary orbits;

3. spread spectrum CDMA technology with forward error correction;

4. low power, omnidirectional transceivers;

5. a high degree of power and frequency coordination using a network controller; and

6. associated ground system elements.

No attempt has been made by Celsat to show that any of these features are anything but "routine design features" which reflect merely the use of existing satellite technology." LQSS Opposition, PP. pp. 6-7.

CELSAT submits that, in the face of acknowledgements like these, and in the total absence of any other serious challenges to the technical feasibility of CELSAT's HPCN proposal, CELSAT has met its burden.

A. CELSAT's Technical Submissions Were Demonstrative Of CELSTAR®'s Feasibility As To The Most Essential Elements

Several parties have attempted to excuse their failure or inability to find serious technical fault with CELSAT's proposed HPCN on the basis that CELSAT did not supply sufficient technical detail.[16] While CELSAT disputes these claims, it is nevertheless hereby supplementing the technical detail in its original application with two items apparently of particular interest -- namely, more information on the space

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[16] See, e.g., TRW and GTE:

"CELSAT erroneously contends that the Appendices attached to its Rulemaking petition provide convincing evidence of its proposed system's feasibility. . . . Rather, such appendices contain nothing more than descriptions of elements of the CELSTAR system design and self-serving unsupported assertions which appear to be based on no empirical data whatsoever." TRW Petition to Dismiss or Deny p. 15, fn. 10.

"CELSAT has only provided a partial technician description of its system, has not filed an experimental application, and has not demonstrated that its described system is technically feasible. " GTE Comments, Opposition, PP p. 8.

Also, LQSS, Opposition, PP, p. 8. Notwithstanding the above, there has been an acknowledgement that CELSAT did provide a lot of useful information. GTE Comments, RM p.1

segment of its planned satellite system (see, SUPPLEMENTAL APPENDIX A), and a copy of the Mallinckrodt patent (SUPPLEMENTAL APPENDIX B).[17]

Several respondents have made much of several references in the Petition to details to be found in "the Application".[18] Again, this is a diversion; with respect to the real substance of these proceedings, any such references to an application are totally irrelevant *if* the information which was supplied was adequate to demonstrate the approach and feasibility of the proposal. CELSAT maintains that the information provided covers all possible issues of technical feasibility in *exceptional* detail. In addition, it now further supports its position with responsive detail in the following paragraphs.

"CELSAT has failed to demonstrate the feasibility of HPCN"
(LQSS, PP p.10. GTE p.6 and others).

The feasibility of the HPCN can be said to rest on two parts of the design: 1) the feasibility of the elements, and 2) their sizing and integration into a feasible system. As to the former, several of the respondents have themselves argued strongly the point that there is nothing new in the CELSAT proposal, or that ***all*** the elements of the CELSAT proposal are "old technology". Loral-Qualcomm argues in successive sentences that:

> 1) "CELSAT has cannot demonstrate the viability of its proposal" and
>
> 2) "CELSAT's proposal is based on the use of technology to which CELSAT has no rights". (LQSS, PP p.2)

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[17] See, e.g., "It would have been helpful for the FCC's review if [CELSAT's] patent had been provided." GTE Comments, opposition, PP p. 9, fn. 7.

[18] It was clarified, however, in CELSAT's subsequently filed Request for Pioneers Preference that no such application would be filed until after the conclusion of the WARC-92 conference. Request, at p. 2.

The reason for such references is that at one time during the preparation of the Petition it was planned to make the CELSTAR Application simultaneously, until the futility of doing so became obvious for the reasons discussed above and affirmed by the reference comments from the opposition. Any remaining, inoperative references in its Petition to details in the "application" is unfortunate and may have been unintentionally misleading.

In some sense it seems that the several parties arguing both "old technology" and "unproven feasibility" must be considered to have canceled out at least one of such arguments with the other. Indeed, no stronger proof of feasibility is possible or conceivable than that all elements of the technology are, individually, well established and repeatedly proven in application.

Several parties (LQSS, TRW, AMSC, and Motorola) have made very generalized, totally unfocused complaints as to lack of details usually found in an application, but with no particulars whatsoever as to just what critical item(s) it is that they consider important and missing. We can hardly answer such generalized complaints other than to say that in CELSTAT's view, all the material critical to the evaluation of feasibility, capacity, and spectral efficiency has been provided. The missing detail should be recognized by any person experienced and moderately expert in the field as straightforward and non-critical. It is impossible to avoid the conclusion that such vague, generalized criticism is based upon weighing the CELSAT submission on the bathroom scales rather than on its intellectual, technical, and public benefit contribution.

"Critical items not included in the explanations"
(GTE, PP p. 11-12)

CELSAT went to extraordinary, and so far as we are aware, unprecedented pains in the Petition (Petition, Appendix E) to provide an extensive, 10 page, line-by-line explanation of the basis and assumptions underlying 54 of the 64 lines in our exceptionally detailed link power and capacity budgets in appendix E. The few items that were omitted were omitted not because they contained any mysteries, but because the explanations seemed so trivial that to burden the reader with them might have been an insult. Nevertheless, the missing line explanations requested by GTE are now included in SUPPLEMENTAL APPENDIX C.

Antenna Issues

Only two parties raised a question directed specifically at CELSAT's proposed 20 meter antenna:

> "These include the technical feasibility of the space-segment multi-beam antenna proposed by CELSAT. GTE is not aware of the commercial availability of such antennas and, thus, does not have any manufacturer specifications to use as a benchmark to evaluate CELSAT's claims . . . ." GTE RM p. 4

And:

> Celsat does not demonstrate in its petition that the characteristics which distinguish its system from AMSC's satellite system relies on much larger antennas than AMSC proposes in order to achieve smaller cells on earth and the increased spectrum efficiency which Celsat proclaims for its system. However, such antennas must conform to a more ideal shape in space than is customary today to achieve the required pointing accuracy and beam shape. Celsat has not demonstrated in its petition that such perfection can be achieved. MSC RM p. 5.

Perhaps this might have been anticipated, considering that neither has experience in designing complete spacecraft or even spacecraft antennas of the nature proposed by CELSAT. Of the companies responding to the Public Notice only two are satellite designers, Loral and TRW. Neither made any comments challenging the technical feasibility or practicality of the 20 meter design.

CELSAT does not believe that it can do total justice to either question in the time permitted for this Reply. For now, it should suffice that on June 3, 1991, in support of AMSC's filing and in criticizing the inordinate technical risks associated with the IRIDIUM design, Hughes (another experienced spacecraft designer) proposed a 56 foot diameter dish antenna and 263 feeds which went unchallenged. The difference in design risk between a 56' and CELSAT's 20 m antenna is negligible.

In summation, CELSAT's petition for rulemaking contained all the technical information required to fully demonstrate the technical viability of its system concept case. Not a single serious respondent (AMSC, LQSS, Motorola, or TRW) gave the slightest shred of analysis, data, or evidence that there was <u>any</u> problem related to technical feasibility, capacity, frequency efficiency or cost of the Celstar system, or any errors in the supporting materials that CELSAT provided. In fact, while AMSC made no allegation of any such deficiency, the others could find nothing more critical to say than:

o "[CELSTAR involves]...relatively routine design features which reflect merely the use of existing satellite communications technology." LQSS, PP page 6

o ". . . the cornerstone of Celsat's system . . . large aperture multi-beam antennas and CDMA, are well known . . . ." Motorola , PP page 25

o "[CELSTAR's]. . . technology is well developed . . ." TRW, PP, page 14

Regardless of LQSS, Motorola, and TRW's unsupported assertions that Celsat did not demonstrate the technical feasibility of the Celstar system, and Motorola and TRW's further inference that an experimental license was necessary, their inability successfully to attack any element of Celsat's claimed cost, capacity, frequency efficiency, system design, hybrid handsets, etc., verifies thoroughly all elements of CELSAT's proposal and underscores the fact that it has conclusively demonstrated the feasibility of the HPCN concept to the degree required for a Pioneers Preference.

B. CELSAT Welcomes The Opportunity To Respond To Certain Apparent Misunderstandings Of The CELSTAR® System Concept

GTE alone has taken the trouble to respond with specifics of missing details and CELSAT is pleased to respond as follows to the issues it raised.

Data Rates, power Control, and Capacity Issues:

Data available to CELSAT indicate that while fades of 20 dB do occur they are not *common* but rather low probability, less than 1%, particularly outside of downtown city areas, and for elevation angles greater than 31 degrees, conditions which characterize CELSTAR satellite service over CONUS. No current mobile satellite application from any contender provides margin for fades of such depths. Neither CELSTAR nor any other mobile satellite system will work inside tunnels.

As pointed out in the CELSTAR petition (Petition, p. E3-4) received signal sensing power control is essentially instantaneous (microseconds) on the user-to-satellite (up) link. An *average* margin of 1.0 dB is provided for the uncompensatable component (e.g. shorter than microsecond) of uplink fading.

On the down-link we further pointed out that link power control is approximately 1/2 second stale by the time it is needed. Except for very low probability multipath fades the major fading effects are slow, log-normal, power fades. These will be partially compensated by power control at the gateway. 4 dB *average* margin is built in to allow for the residual uncompensated component of such down link fading. That is to say, even in a no-fade condition, each link power control is set to operate 4 dB above threshold, and there is a 10 to 12 dB link power overhead provided above that average operating point (Petition, p. E-7).

As for CELSAT's capacity calculations in Appendix E it must be remembered that CELSAT's power budgets are and must be for the *average* user. There is an increase in propagation loss for users at the northern coverage limits and a decrease in propagation loss for users at the southern limits. In just the same way, there is an increase in loss for users at the edge of a cell and a decrease in loss for users at the center of a cell. In both cases the power control system acts to ensure that an adequate signal is received at each user and from each user.

As discussed in the Petition (Petition p.E-7) the user-spacecraft-user link power amplifiers all provide sufficient overhead power capability above the expected average to accommodate occasional peak requirements. The CELSTAR capacity limit is set not by the power requirements of any individual link but by the overall total power limits as set either by total flux density limits or (if CELSAT's requested flux density limits increases are granted) by total available satellite power and storage energy. Within very broad limits, tradeoff of power capacity between links within a cell and between cells is possible and, in fact, automatic. Thus it is appropriate and it is for this reason that the CELSTAR power budget addresses *average* power requirements, both with respect to user latitude and with respect to user position within a cell.

To be sure there is not a misunderstanding as to the "delay" issue (GTE, PP p.13) it should be stated that it is not CELSTAR's intention to serve the mobile-to-mobile community except under special circumstances or, as in the case of facsimile and certain data transactions, where any such delay would be unnoticeable.